APPLICATION NO. 09/846,410

INVENTOR: Urbain A. von der Embse

TITLE OF THE INVENTION

Multiple Data Rate Hybrid Complex Walsh Codes for CDMA

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Currently amended SPECIFICATION

Amendments to the original specification are the corrections for errors and these corrections do not change the original specification

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In line 1 please add the underlined words.

In line 2 please delete the strikethrough word and add the underlined words.

In line 4 please delete the strikethrough period and add the underlined word.

In line 6 please add the underlined title.

In line 9 please delete the strikethrough text and add the underlined text.

In lines 18-20 please delete the strikethrough text and add the underlined text.

In lines 27-33 please delete the strikethrough text.

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In lines 3,4,6,7 please delete the strikethrough words and add the underlined words.

current multiple data rate real Walsh CDMA decoding in equations **(2)**. This block diagram becomes a representative implementation of the CDMA receiver which implements the ~~new~~ multiple data rate hyibrid complex Walsh and generalized hybrid complex Walsh CDMA decoding when the current multiple data rate real Walsh CDMA decoding **27** is replaced by the ~~new~~ multiple data rate hybrid complex Walsh and generalized hybrid complex Walsh CDMA decoding of this invention.

FIG. **3** signal processing starts with the user transmitted wavefronts incident at the receiver antenna **22** for the users $\{u_m\}$. These wavefronts are combined by addition in the antenna to form the receive (Rx) signal $\hat{v}(t)$ at the antenna output **22** where $\hat{v}(t)$ is an estimate of the transmitted signal v(t) **16** in FIG. **1**, that is received with errors in time Δt, frequency Δf, phase $\Delta\theta$, and with an estimate $\hat{z}(t)$ of the transmitted complex baseband signal z(t) **16** in FIG. **1**. This received signal $\hat{v}(t)$ is amplified and downconverted by the analog front end **23** and then synchronized and analog-to-digital (ADC) converted **24**. Outputs from the ADC are filtered and chip detected **25** by the fullband chip detector, to recover estimates $\{\hat{Z}(n)\}$ **26** of the transmitted signal which is the stream of complex CDMA encoded chips {Z(n) **14** in FIG. **1**. CDMA decoder **27** implements the algorithms in equations **(2)** by stripping off the PN code(s) and decoding the received CDMA real Walsh orthogonally encoded chips to recover estimates $\{\hat{Z}(u_{m,k_m})\}$ **28** of the transmitted user data symbols $\{Z(u_{m,k_m})\}$ **12** in FIG. **1**. These estimates **28** are processed by the symbol decoder **29** and the frame processor **30** to recover estimates **31** of the transmitted user data words.

It should be obvious to anyone skilled in the communications art that this example implementation clearly

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In lines 20-21 please delete the strikethrough symbol and add the underlined symbol and text.

defines the fundamental current CDMA signal processing relevant to this invention disclosure and it is obvious that this example is representative of the other possible signal processing approaches.

FIG. **4** multiple data rate real Walsh CDMA decoding is a representative implementation of the multiple data rate real Walsh CDMA decoding **27** in FIG. **3** and in equations **(2)**. Inputs are the received estimates of the multiple data rate comple real Walsh CDMA encoded chips $\{\hat{Z}(n)\}$ **32**. The PN scrambling code is stripped off from these chips **33** by changing the sign of each chip according to the numerical sign of the real and imaginary components of the complex conjugate of the PN code as per the decoding algorithms **8** in equations **(2)**. Real Walsh channelization coding is removed in **34** by a pulse compression operation consisting of multiplying each received chip by the numerical sign of the corresponding Walsh chip for the user and summing the products over the N Walsh chips to recover estimates $\{\hat{Z}(u_{m,k_m})\}$ **35** of the user complex data symbols ~~$\{Z(u_{m,k_m})\}$~~ $\{Z(u_{m,k_m})\}$ after renormalization by the divisor 2N not depicted in the drawing.

It should be obvious to anyone skilled in the communications art that this example implementation clearly defines the fundamental current CDMA signal processing relevant to this invention disclosure and it is obvious that this example is representative of the other possible signal processing approaches.

For cellular applications the transmitter description describes the transmission signal processing applicable to this invention for both the hub and user terminals, and the receiver

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In lines 14,16,17.19,20 please delete the strikethrough text and add the underlined text.

In lines 23-26,28,29 please delete the strikethrough text and add the underlined text.

In line 33 please delete the strikethrough word and add the underlined word.

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In lines 1-9 please delete the strikethrough text

In lines 11-22 please delete the strikethrough text and add the underlined text.

In lines 26-28 please delete the strikethrough text and add the underlined text.

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In lines 27-28 please delete the strikethrough word and add the underlined words.

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In lines 5-6,8 please delete the strikethrough text and add the underlined text.

In lines 11,13-15 please delete the strikethrough text and add the underlined text.

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In lines 1-2 please delete the strikethrough word and add the underlined words.

In lines 10-17 please delete the strikethrough text

In lines 19-20 please delete the strikethrough text.

In lines 31-35 please delete the strikethrough text and add the underlined text.

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In lines 1-4 please delete the strikethrough text and add the underlined text.

In lines 9,12,15 please delete the strikethrough text and add the underlined text.

In lines 26-31 add the underlined text.

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In lines 1-2,5,8 please add the underlined text.

In lines 23-24 please delete the strikethrough numbers and add the underlined numbers.

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In lines 2-3 please delete the strikethrough text and add the underlined text.

In line 9 please delete the strikethrough words and add the underlined word.

In line 29 please delete the strikethrough words and add the underlined word.